UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/980,443	08/08/2002	Hong Lye Oh	851663.432USPC	3555

30423 7590 07/10/2008

STMICROELECTRONICS, INC.
MAIL STATION 2346
1310 ELECTRONICS DRIVE
CARROLLTON, TX 75006

EXAMINER	
HUBER, JEREMIAH C	

ART UNIT	PAPER NUMBER
2621	

MAIL DATE	DELIVERY MODE
07/10/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/980,443	OH ET AL.	
	Examiner	Art Unit	
	JEREMAIAH C. HUBER	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *March 27, 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☒ Claim(s) *25 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *5/13/1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims [Fill In] are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al (GB2308774) in view of Harradine et al (4862260).

In regard to claim 1 Morgan discloses a method for motion estimation for use in a moving pictures sequence wherein data representing the picture in the sequence comprises a plurality of data blocks (Morgan Fig. 1) that includes:

selecting a group of related data blocks from the plurality of related data blocks of the picture (Morgan page 8 line 33 to page 9 line 7);

for each data block in the selected group obtaining a corresponding block motion vector from a previously processed picture in the moving pictures sequence (Morgan page 8 line 33 to page 9 line 19 note motion vector generated for each block from the point of maximum correlation);

classifying the block motion vectors from the selected group into a plurality of sub-groups (Morgan pgs. 13 line 24 to pg. 15 line 13 particularly note pg. 15 lines 5-13 motion vectors are classified into sub-group bins according to co-ordinate value).

determining a primary and a plurality of secondary global motion vectors corresponding to block motion vectors (Morgan page 9 line 31 to page 10 line 25 and

page 13 line 24 to page 16 line 5 note identifying motion vectors with highest count and meeting other criteria as global motion vectors also motion vector with highest count is primary because it is most representative of all motion vectors in the frame); and

selecting the primary and or secondary motion vectors for use in defining one or more search windows for each block in the selected group to enable block matching with a reference picture (Morgan page 10 line 24 to page 11 line 8 note each selected vector will be tested for correlation).

Morgan further discloses that motion vectors are classified into sub-groups, or bins, by indexing a frequency array, therefore each bin contains only identical motion vectors (Morgan pg. 15 lines 5-13). It is noted that Morgan does not disclose details of sub-groups containing a plurality of motion vector values. However, Harradine discloses a representative motion vector processing method which utilizes a polar histogram, or frequency array, with bins, or sub-groups, that encompass a plurality of different motion vectors (Harradine Fig. 12 and col. 16 line 66 to col. 17 line 17). Harradine further discloses selecting a single motion vector representative of a bin or sub-group (Harradine col. 17 lines 15-17). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of using a polar histogram as taught by Harradine in the invention of Morgan in order to gain the advantage of fine and course grouping as suggested by Harradine (Harradine col. 17 lines 7-9).

In regard to claim 2 refer to the statements made in the rejection of claim 1 above. Harradine further discloses a polar histogram which groups motion vectors

according to the spatial relationship of the motion vector values. In addition Morgan and Harradine both disclose combining sub-groups based on spatial characteristics of the motion vector values (Morgan pg. 15 lines 14-19 note global motion vectors correspond to multiple sub-groups for which motion vectors are similar, Harradine col. 17 lines 18-27 note adjacent bins with high frequency counts can be combined).

In regard to claim 4 refer to the statements made in the rejection of claim 1 above. Morgan further discloses determining a match between each block in the selected group and a matching block in one or more search windows for that block in the reference picture and determining a computed motion vector between each block in the selected group and its matching block (Morgan page 10 line 26 to page 11 line 8).

In regard to claim 5 refer to the statements made in the rejection of claim 4 above. Morgan further discloses storage of motion vector data (Morgan page 15 lines 6 –14).

In regard to claim 7 refer to the statements made in the rejection of claim 1 above. Morgan further discloses analyzing the distribution of global motion vectors and selecting a motion estimator scheme on the basis of a distribution metric (Morgan page 10 line 26 to page 11 line 8 note that the search pattern will differ for each block depending on motion vectors that are selected to be tested also note page 12 line 31 to page 13 line 8 global MV's are selected based on frequency of use also note pg 16 lines 25-28 global vectors may be selected based on spatial distribution).

In regard to claim 8 refer to the statements made in the rejection of claims 1 and 7 above.

In regard to claim 10 refer to the statements made in the rejection of claims 1 and 8 above.

In regard to claim 16 refer to the statements made in the rejection of claims 1 and 8 above.

In regard to claim 18 refer to the statements made in the rejection of claims 1 and 10 above.

In regard to claim 20 refer to the statements made in the rejection of claim 1 above. As stated in claim 1 above the primary global motion vector is the motion vector with the highest count, while secondary motion vectors are those with lower counts. Therefore a secondary global motion vector necessarily depends on the primary global motion vector because if the secondary motion vector must have a lower count. Further, initial secondary global motion vectors will inherently be determined when evaluating the first frame. Morgan further discloses updating global motion vectors based on block motion vectors classified into the corresponding sub-group (Morgan pg. 15 lines 5-13).

In regard to claim 24 refer to the statements made in the rejection of claim 1 above. Morgan in view of Harradine discloses selecting, as a group, all motion vectors of an input field (Morgan pgs 15 lines 5-13) and a corresponding primary global motion vector (Morgan page 9 line 31 to page 10 line 25 and page 13 line 24 to page 16 line 5). It is noted that an input field is encompasses more than a row. However, the claims precede under the inclusive term comprising, therefore they do not exclude selecting a group that encompasses more than claimed. Thus, Morgan in view of Harradine meets the claim limitations.

1. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in view of Harradine and in further view of Horne (5473379).

In regard to claim 3 refer to the statements made in the rejection of claim 1 above. Morgan in view of Harradine further discloses selecting an average as a representative motion vector for sub-groups (Harradine col. 17 lines 18-27). It is noted that Morgan in view of Harradine does not disclose the use of a primary global motion vector that is the average of all motion vectors in the selected group. However Horne discloses a motion compensation apparatus where a global motion vector is determined to be the average of all of the motion vectors used in the previous frame (Horne fig. 4 and col. 12 line20 to col. 13 line 55 note col. 12 lines 20-28). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of including a global motion vector as taught by Horne, in the set of global motion vectors of Morgan in view of Harradine in order to improve motion compensation techniques as suggested by Horne (Horne col. 10 lines 46-49).

2. Claims 6, 9, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in view of Harradine and Yagasaki et al (5428396).

In regard to claims 6, 9, 17 and 19, Morgan in view of Harradine discloses a motion estimation method as argued in the rejection of claims 1, 8 and 10 above. Morgan further discloses processing based on motion vector length (Morgan page 14 line 21 to page 15 line 4). It is noted that Morgan in view of Harradine does not disclose

details of variable length coding (VLC). However, Yagasaki discloses a method VLC for motion vectors that adapts to optimally fit a given range of motion vectors (Yagasaki col. 8 line 26 and col. 9 line 8). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of including in Morgan in view of Harradine a VLC coding method as taught by Yagasaki in order to reduce space necessary to store the video data.

3. Claims 11-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in view of Harradine and Krause et al (5093720).

Morgan in view of Harradine discloses a motion estimation method as stated in the rejection of claims 1 and 8 above. It is noted that Morgan in view of Harradine does not disclose details of multiple motion estimators. However Krause discloses a video processing system that comprises plural motion estimators in order to estimate motion for both of the previous odd and even fields in relation to the current field (Krause Figs 3-4 and col. 4 line 52 to col. 5 line 7). It is therefore considered obvious that one of ordinary skill in the art would recognize the advantage of modifying the single field block matching of Morgan in view of Harradine to include plural motion estimators to compare a current field to both of the previous even and odd fields as taught by Krause in order to improve compression efficiency as taught by Krause (Krause col. 5 lines 1-7).

In regard to claim 12 refer to the statements made in the rejection of claim 11 above. Morgan discloses a means for determining a maximum search range on the

basis of the global motion vector (Morgan pg. 14 line 15 to pg. 15 line 13 note 'long' vector threshold sets maximum search range allowed for a global motion vector).

In regard to claims 14 refer to the statements made in the rejection of claims 1 and 8 above.

4. Claims 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in view of Krause as applied to claim 11 above, and further in view of Yagasaki.

The modification of Morgan in view of Harradine and Krause does not disclose details of variable length coding (VLC). However, Yagasaki discloses a method VLC for motion vectors that adapts to optimally fit a given range of motion vectors (Yagasaki col. 8 line 26 and col. 9 line 8). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of further modifying Morgan in view of Harradine and Krause to include a VLC coding method as taught by Yagasaki in order to reduce space necessary to store the video data.

In regard to claim 15 refer to the statements made in the rejection of claims 11 and 13 above.

Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan in view of Harradine and Vector Quantization in Speech Coding (VQSC) and in further view of Golin (6058143).

In regard to claims 21-23 refer to the statements made in the rejection of claim 1 above. Morgan in view of Harradine discloses a method of determining and selecting global motion vectors and using the global motion vectors to determine a block matching motion estimation search window scheme. It is noted that Morgan in view of Harradine does not disclose assigning each block motion vector to a closest global motion vector. However, the classifying process described in claim 21 is a well known classification algorithm known as a k-means clustering as demonstrated in VQSC. VSQC discloses a k-means algorithm in which data is assigned to the nearest cluster center (VQSC pg. 1557 note k-means step 2). VSQC further discloses details of initializing the cluster centers (VSQC pgs. 1557, 1579 note K-means step 1), and updating cluster centers (VQSC pg. 1557 note K-means step 3) and repeating classification with updated cluster centers (VQSC pg. 1557 note K-means step 4). Further, Golin discloses that it was well known to apply such clustering techniques in order to obtain motion vector candidates in video coding (Golin col. 5 lines 49-57). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of utilizing the well known k-means clustering technique to determine some of the global motion vectors in Morgan in view of Harradine in order to determine the best representative motion vector of closely grouped motion vectors as suggested by Golin (Golin col. 5 lines 49-57).

Allowable Subject Matter

Claims 25 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 25 and 26 stipulate that the variety of search methods or schemes include an exhaustive, logarithmic, and hierarchical search methods or schemes.

The closest art is Morgan in view of Harradine which discloses selection classification of a group of motion vectors, selection of primary and secondary global motion vectors, and performing motion estimation using a particular scheme based on selected characteristics of the selected global motion vectors. However, Morgan in view of Harradine does not disclose selecting among the schemes listed in claims 25 and 26.

Response to Arguments

5. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

In response to the applicant's arguments made in regard to claims 7, 8 and 11, the applicant asserts that Morgan disclose selecting between plural motion estimation and search schemes. The examiner must disagree. The examiner reiterates the arguments made in the previous Office action dated 12/27/2007 which are omitted for brevity. The applicant seems to impute a certain meaning to the terms scheme and method. The terms similarly relate to a process of achieving a desired result. The applicant asserts that because Morgan determines correlation between test blocks for

selected motion vectors that the same method or scheme is always applied. The examiner must disagree. The examiner notes that Morgan determines correlation between test blocks for selected motion vectors. However, the selected motion vectors of Morgan may differ greatly from one iteration to the next. That is the tested portions, or search pattern, of the input field in one iteration may define an entirely different area from the search pattern in another iteration depending on the characteristics of the selected motion vectors. The examiner believes this to be similar to the applicant's specification which indicates selecting certain search patterns, such as exhaustive or logarithmic depending on the characteristics of the selected motion vectors (Spec. pg. 7 lines 7-19).

In response to the applicant's arguments made in regard to claim 20 the examiner reiterates the arguments made in the previous Office action dated 12/27/2007 which are omitted for brevity. The applicant specifically asserts that even if there is an inherent determination of initial secondary global motion vectors that there is no support for determining secondary global motion vectors based on the primary global motion vector. The examiner must disagree. The examiner is interpreting the most common motion vector of Morgan as the primary global motion vector, and any other motion vectors that occur more than the threshold as secondary. Therefore, a motion vector cannot be said to be secondary until another motion vector is determined to be primary. The examiner believes this meets the limitation of determining secondary global motion vectors based on primary global motion vectors.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEREMAIAH C. HUBER whose telephone number is (571)272-5248. The examiner can normally be reached on Mon-Fri 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jeremiah C Huber
Examiner
Art Unit 2621

/Jeremiah C Huber/
Examiner, Art Unit 2621

/Mehrdad Dastouri/
Supervisory Patent Examiner, Art Unit 2621